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Composition and Nutritive Value of Pork as Related to Weights of Animals and Cuts

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CONTENTS

	Page
Introduction	1
Previous work	2
Objectives of the study	3
Hogs used	3
Experimental procedure	5
Results	6
Weights of carcasses and cuts	6
Separable-fat content	7
Separable-lean content	8
Results—(continued)	
Edible-meat content	9
Ether-extract (fat) content and caloric value	10
Protein content	11
Estimation of weights, composition, and nutritive value	13
Application of results	20
Summary and conclusions	21
Literature cited	22

INTRODUCTION

The fattening of hogs and other meat animals requires more feed per unit increase in weight than does the growing. Therefore, as animals approach market weight and finish, the gains become more and more costly. The fact that certain fattening feeds may not be available also enters the picture. Primarily for these reasons, producers have a definite interest in the degree of finish of their animals when ready for market. Moreover, the size and nutritive value of cuts of meat and the proportions of lean, fat, and bone in them mean much to consumers. There is, in fact, a succession of interests beginning with the producer, including the wholesale and retail meat trade, and ending with the consumer. Full information on the composition and nutritive value of meat in relation to the most desirable degree of fattening is therefore useful in dealing with numerous questions, economic and otherwise, that arise in the production, marketing, and consumption of meat. This is particularly true of pork, which, in the United States, is consumed in larger quantity than any other meat. The work reported here represents an effort to supply such information.

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PREVIOUS WORK

The problem has many ramifications. Several institutions have issued publications that throw light on certain relationships between type and weight of hogs, on the one hand, and composition of their carcasses, on the other hand. In working with self-fed hogs of the "chuffy" type,[2] the Illinois Agricultural Experiment Station, as reported by Bull and coworkers (*3*),[3] slaughtered representative animals at live weights of approximately 170 and 200 pounds. Among the factors determined were the weights and physical composition of the dressed carcasses and cuts. As examples of the differences found, hams (uncured) from the lighter and heavier hogs weighed on the average about 12.3 and 14.0 pounds, respectively. Those from the lighter hogs contained 62.3 percent of lean meat and 22.8 percent of fat. For the 200-pound hogs the corresponding percentages were 61.3 and 24.8.

Bull and Longwell (*2*) and Mitchell and Hamilton (*9*) have described the findings from another experiment conducted by the Illinois station on hogs of intermediate type that were hand-fed and slaughtered at weights of approximately 175, 225, and 275 pounds. Numbers were small, especially of the 175-pound and 275-pound hogs. Exemplifying results, fresh picnic shoulders from the hogs of the three weights mentioned averaged 6.8, 7.9, and 9.1 pounds, respectively. They contained 60.6, 67.0, and 62.4 percent of lean and 18.3, 16.5, and 21.2 percent of fat. The dressed carcasses contained 12.5, 11.6, and 10.5 percent of protein and 39.8, 45.1, and 51.9 percent of fat (ether extract),[4] respectively.

At the Nebraska Agricultural Experiment Station, as reported by Loeffel and coworkers (*8*), medium- to large-type pigs were self-fed, and five representative animals were slaughtered at each of selected weights ranging from 150 to 400 pounds. With the advance from the lowest to the highest weight, the percentage of fat in the carcass, exclusive of the leaf fat, head, and feet, almost doubled, whereas the percentage of lean meat decreased from about 52 to 34. The composition of certain cuts likewise showed striking changes. The protein content of the edible portion of the loin cut decreased from 15.9 to 13.7 percent, accompanied with an increase in fat (ether extract) content of 27.9 to 42.6 percent.

At the Missouri Agricultural Experiment Station, Hogan and others (*7*) worked with lard-type and bacon-type hogs. One hog of each type was slaughtered at 100, 150, 200, 250, and 300 pounds. Included among the observations were weights and physical composition of the shoulders, hams, bacon, and loins. As live weight increased from 100 to 300 pounds, the weight of trimmed hams from the lard-type hogs, for example, increased from 7.3 to 22.0 pounds each, and the percentage of separable lean [5] decreased from 76.9 to 59.3.

The Bureau of Animal Industry (*10*) found that in pigs beyond 10 weeks of age there was little increase in the protein content of pork muscle on the fat-free basis. This was true for both large- and small-type pigs.

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[2] Signifying a small-type, early fattening animal.

[3] Italic numbers in parentheses refer to Literature Cited, p. 22.

[4] The term "ether extract" signifies the total material, largely fat, extracted by ether in chemical analysis. The term is practically synonymous with fat.

[5] The term "separable lean" signifies the quantity of lean meat that can be separated by hand from the fat and bone. It includes small deposits of fat, macroscopic as well as microscopic, interspersed among the muscle fibers.

In a study in which full-fed hogs of intermediate type were slaughtered at 50-pound intervals from 175 to 375 pounds in weight, the Bureau of Animal Industry (*11*) also found that the corresponding range in ratio of muscle to bone was 2.86:1 to 3.58:1. However, there was little variation in the proportion of fat within the muscle among the several groups.

Chatfield and Adams (*4*) presented values for the chemical composition of thin, medium, and fat fresh pork carcasses, of both the packer and shipper classes,[6] as well as for the various wholesale cuts. Data were given on both the as-purchased and edible-portion basis.

OBJECTIVES OF THE STUDY

The chief objectives of the research here reported were to bring out more clearly the relationships between the weights of cuts and live weight of the animals and between the physical and chemical composition, as well as energy value, and the weights of animals, carcasses, and cuts. These objectives also included a means of estimating the weight, composition, and energy value of the carcass or any cut at any point desired within the weight range studied.

HOGS USED

There has been much uncertainty in the United States as to the most desirable type of hog. Early in the present century, low-set, blocky, early maturing, small-type animals were popular. However, certain characteristics of this type came to be recognized as disadvantages, and a trend began toward the production of hogs with greater tendency to grow and less tendency to fatten. Ultimately this trend was carried to the extreme and many underfinished hogs, often lacking in muscular development and with too high a proportion of bone, were produced. Then the pendulum of preference swung to a type intermediate between the two extremes. This type has met with much favor, and there is rather general agreement among livestock producers and meat dealers that future swine improvement will be brought about principally within this type. Accordingly, the research here reported relates to such hogs and their products.

For several years, data relating to the objectives of this study were obtained on 64 hogs selected by a committee of 3 qualified judges as being of the intermediate type. Figure 1 illustrates this type of hog full-fed to a weight of approximately 225 pounds.

It was possible to verify the type of these hogs, since all carcasses were measured by a standard method previously reported (*6*). A representative group of the 64 hogs, averaging 230 pounds in final feed-lot weight and 221 pounds in slaughter weight, had the following average measurements: Length of body (first rib to aitchbone), 786 mm. (30.9 inches); length of hind leg (aitchbone to toe), 578

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[6] Pork carcasses of the packer class are split down the back and have the head off, leaf fat out, and ham facings removed. Those of the shipper class are not split down the back and the head, leaf fat, and ham facings are not removed.

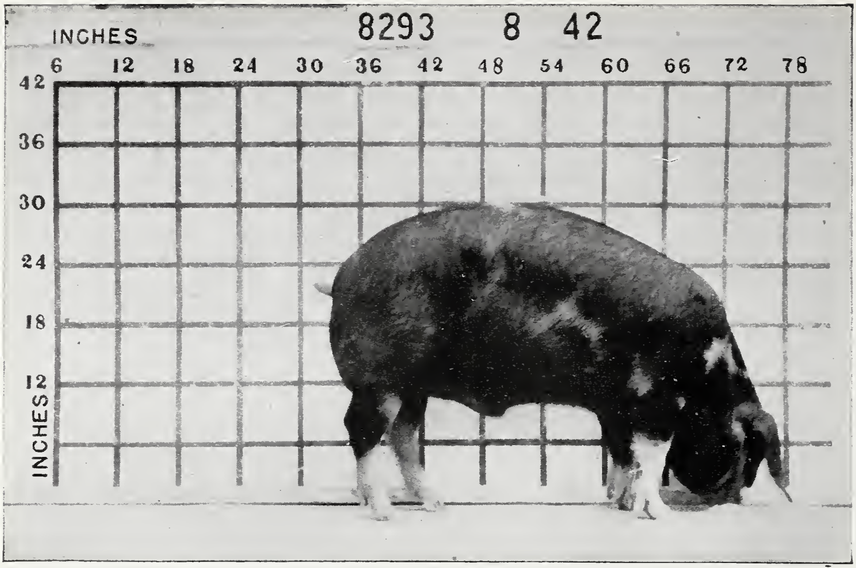

Figure 1.—Hog of intermediate type weighing approximately 225 pounds.

mm. (22.8 inches); average thickness of back fat, 41 mm. (1.6 inches). These values are well in line with the corresponding values for carcasses of 225-pound hogs of intermediate type, as previously reported by the senior author (*5*). The dressed carcass in figure 2, *B*, is from such a hog, and for comparison, in *A* and *C*, are carcasses of large- and small-type hogs of about the same live weight as the animal of the intermediate type.

In general, the hogs used in this study had been fed rations representative of those used in producing market hogs in the United States. Some received well-balanced rations full-fed; others, a limited quantity of feed to 100 pounds of live weight followed by normal rations full-fed; and still others, well-balanced rations moderately restricted in quantity. The rations varied somewhat in protein content and some included peanuts, soybeans, or cull navy beans as the basal feeds.

The breeding of the hogs was also representative and diversified. Of the 64 animals, 25 were Poland Chinas, 18 were Duroc Jerseys, 16 were Chester Whites, 4 were Chester White × Poland Chinas, 1 was Poland China × Chester White, and 1 was Danish Landrace. There were 30 barrows and 34 gilts, and the animals ranged from 196 to 348 days in age at time of slaughter. The live-weight distribution was as follows: 9 animals from 167 to 184 pounds, 31 from 185 to 209 pounds, 19 from 210 to 234 pounds, and 5 from 235 to 254 pounds. Thus, in various respects, the experimental animals were representative of the kind of intermediate-type hogs commonly found on United States markets.

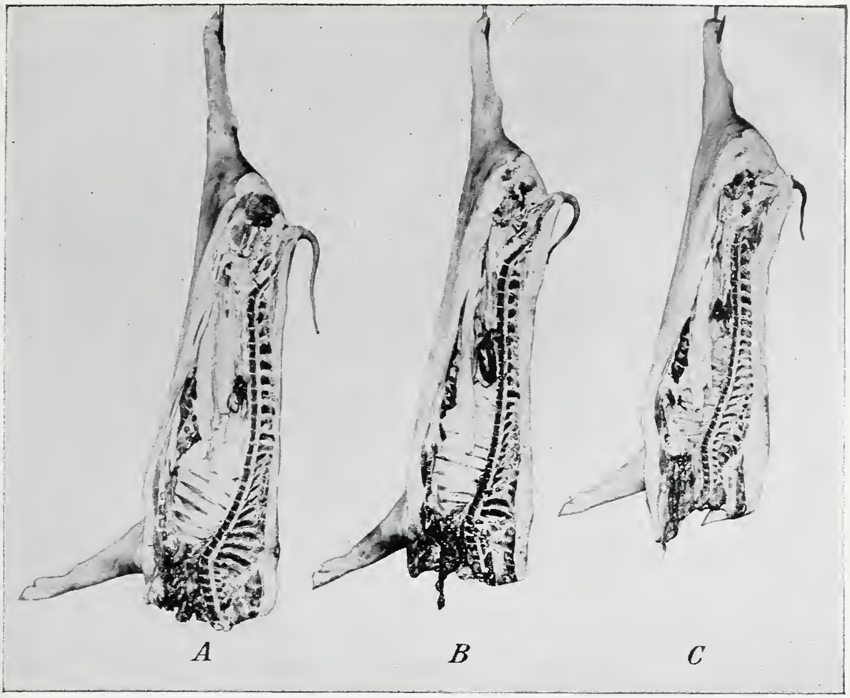

FIGURE 2.—Dressed carcass of an intermediate-type hog slaughtered at a live weight of approximately 225 pounds is shown in *B*. In *A* and *C*, for comparison, are carcasses of large- and small-type hogs, respectively.

EXPERIMENTAL PROCEDURE

All hogs were taken off feed 24 hours before slaughter and given access to water only. Slaughter weight was taken just prior to slaughter. In dressing, the carcasses were split down the center to the head, which was left on; the leaf fat was pulled loose but allowed to remain hanging from the flank end; and the hams were not faced. Chilling of the carcasses normally continued for about 72 hours, at temperatures of approximately 33° to 36° F. Cutting the chilled carcasses involved, in the main, the preparation of full-cut heads; three-rib, full-cut shoulders; short-cut hams; bacon trimmed only enough to remove the teat line and square the corners; and loins with approximately one-half inch of fat covering. Weights of the cuts were obtained without delay to avoid any appreciable loss from evaporation.

In the physical analyses of cuts, precautions were taken to separate the fat, lean, skin, and bone thoroughly. The separated portions were laid on metal trays to prevent absorption of moisture or fat and were weighed promptly to keep evaporation losses at a minimum. Addition of the weights of separable fat and lean gave the weight of edible meat. Chemical analyses were made by official methods of the Association of Official Agricultural Chemists (*1*).

Nutritional studies involved the protein content and the caloric values of various cuts. In accordance with usual practice, caloric values were determined by multiplying grams of protein by 4 and grams of fat (ether extract) by 9 and adding the results.

RESULTS

Weights of Carcasses and Cuts

The trends in weights of carcasses and primary cuts, with increasing live weight of hog, are shown in figure 3. The graph consists essentially of regression lines, which express mathematically the trends based on voluminous data.

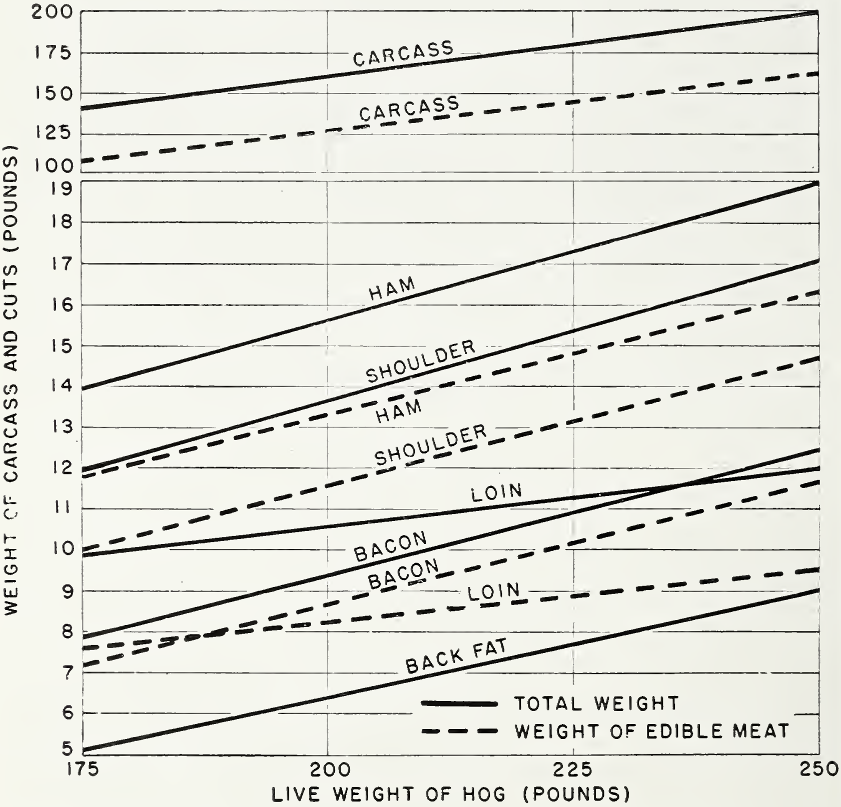

Figure 3.—Total weight and weight of edible meat of dressed carcass and primary cuts in relation to slaughter weight of hogs.

One significant result is the close parallelism between (1) the weights of the carcass and of the different primary cuts, as shown by solid lines, and (2) the weight of the edible portion of each, as shown by broken lines. The divergence or convergence in all cases is relatively slight, showing that the difference in pounds remained practically constant. This means that as the weight of carcass or cut increased the proportion of edible meat tended to increase.

Another noteworthy result is the similarity in slope of the lines for the ham, shoulder, bacon, and back fat. Despite different general weights, each of these cuts increased 1 pound in weight about as rapidly as the others.

The increase in weight of loin was much less than for any other cut. Undoubtedly this was due in large part to leaving a fat covering of only about one-half inch on the loin regardless of the weight of the hog from which it came. This method of trimming was in conformance with market practice.

Attention is called to the fact that two 250-pound hogs, weighing a total of 500 pounds, furnished practically the same quantity of edible meat as three 175-pound hogs, weighing a total of 525 pounds. This observation, however, is not a proper basis for considering the heavier hogs necessarily to be the more efficient producers. They have both advantages and disadvantages in that respect.

SEPARABLE-FAT CONTENT

Results of previous studies (*10*) indicated that after a pig is approximately 10 weeks old there is little change in the chemical composition of the muscle tissue expressed on the fat-free basis. It is readily apparent, however, that with increasing fatness, as the animal approaches maturity, there are marked changes in the composition of the edible tissue as a whole. Figure 4 shows graphically the rela-

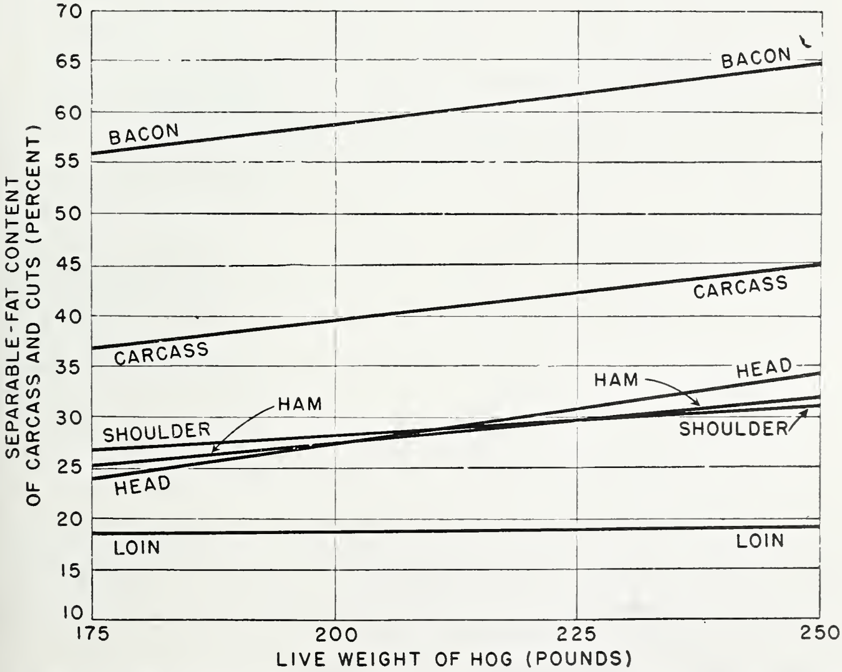

FIGURE 4.—Percentage of separable fat in dressed carcass and primary cuts in relation to slaughter weight of hogs.

tionships between (1) the percentage of separable fat[7] in the dressed carcass and cuts and (2) the live weight of the animal.

Bacon, which had the highest level of fatness, increased in this respect at approximately the same rate as the entire dressed carcass. The difference between the shoulder and ham was small and relatively unimportant. Fat was stored in the head (undoubtedly the jowl) slightly more rapidly than in these two cuts. The very small increase in separable fat of the loin was undoubtedly due to the method of trimming previously described.

SEPARABLE-LEAN CONTENT

Since many meat purchases are made on the basis of the apparent lean-meat content of the cut, the data on separable lean merit particular attention.

Figure 5 shows the trends in separable-lean content of the carcasses and cuts from the 64 hogs, with increasing live weight. The following results are especially noteworthy. On the average, for a hog weighing 175 pounds the percentages of lean meat in the loin and ham were almost the same, about 59 percent. With increasing weight of hog, the percentage of lean meat in the loin rose slightly—to 60 percent. But that in the ham dropped to 54 percent. The shoulder maintained its lean-meat content slightly better than the ham. The lean of the carcass decreased from approximately 41 to 37 percent. That of bacon decreased the most. Five 175-pound hogs, weighing a total of 875 pounds, produced approximately as much lean meat as four 250-pound hogs, weighing 1,000 pounds.

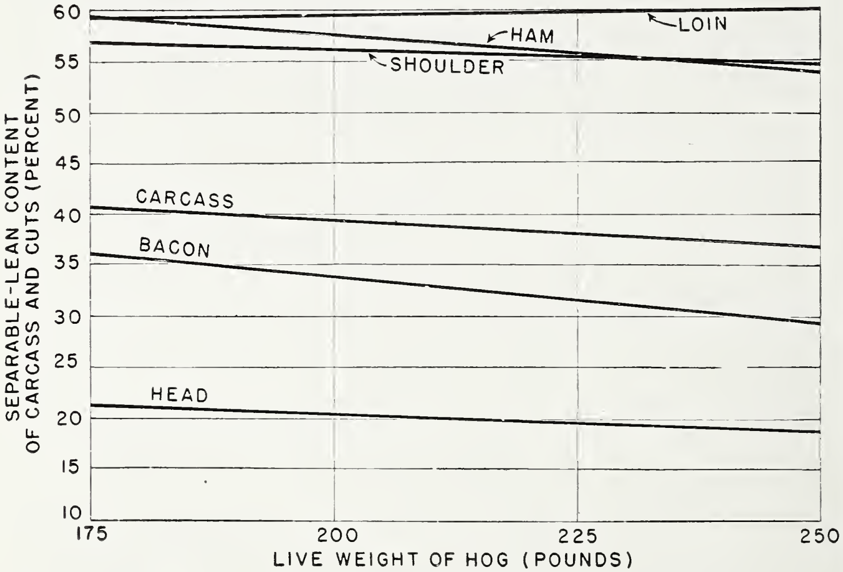

FIGURE 5.—Percentage of separable lean in dressed carcass and primary cuts in relation to the slaughter weight of hogs.

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[7] The term "separable fat" signifies the quantity of fatty tissue that can be separated by hand from the lean, bone, and skin. (See also footnote 5, descriptive of separable lean.)

Edible-Meat Content

The separable lean and separable fat together make up the total edible meat. The relationships between live weight and the proportion of edible meat are shown in figure 6. The trends for percentage of edible meat in all cuts are upward, and most of them parallel rather closely the changes for the entire carcass. Since this figure is essentially the composite of figures 4 and 5, one noteworthy result seen in figure 6 is the dominating influence of the fatty tissue of the carcass in causing the percentages of total edible meat to increase, in spite of the distinct downward trend for lean, shown in figure 5.

With only skin as the inedible portion, bacon ranged from about 92 to 94 percent of edible meat as the hog increased from 175 to 250 pounds in weight. In a 175-pound hog the shoulder contained only a slightly smaller proportion of edible meat than the ham, and in a 250-pound hog there was practically no difference between the two cuts. Although the dressed carcass, as a whole, shows a rather marked increase in the proportion of edible meat with increasing weight of the hog, the change in the loin was small. The increases in the spareribs, head, and shoulder ribs occurred more rapidly than in the carcass or other cuts. The fact that spareribs were about a third meatier than shoulder ribs, throughout the entire range of weights, is worthy of passing note.

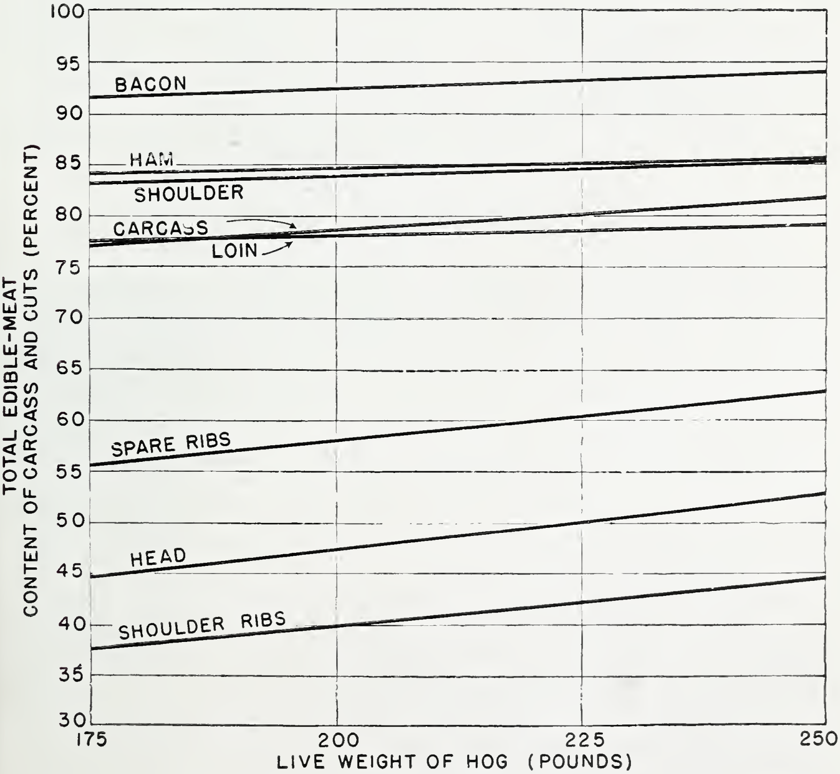

Figure 6.—Percentage of edible meat in dressed carcass and primary cuts in relation to slaughter weight of hogs.

Ether-Extract (Fat) Content and Caloric Value

From the dietary viewpoint it is desirable to know the total amount of fat as determined by ether extraction, as well as the amount of separable fatty tissue, in various cuts of meat.

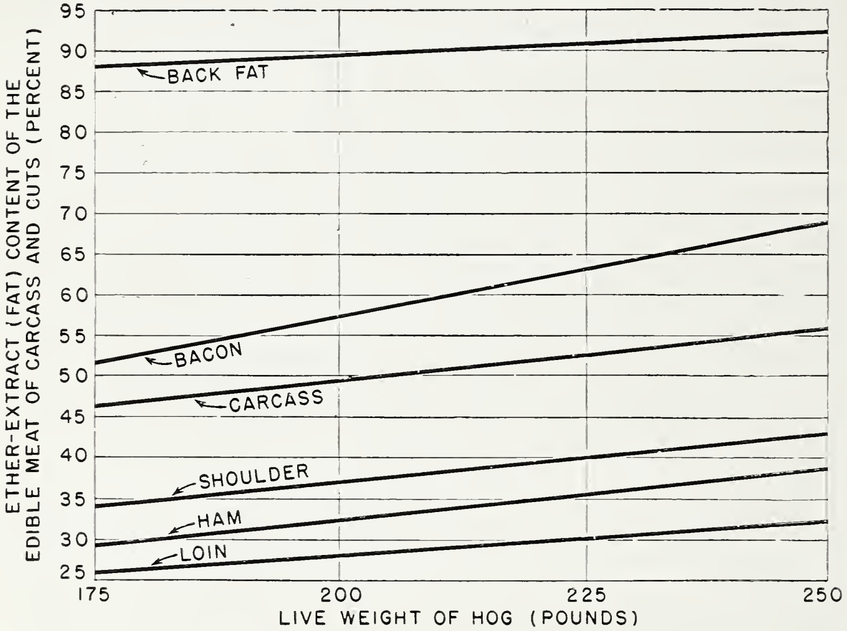

Figure 7.—Percentage of ether extract (fat) in the edible meat of dressed carcass and primary cuts in relation to the slaughter weight of hogs.

Figure 7 shows the ether-extract content of the edible portion of the dressed carcass and the various primary cuts of hogs varying in live weight from 175 to 250 pounds. The extremely high proportion of ether extract in the back fat and the low proportions in the loin and ham are noteworthy. The shoulder contained only about 5 percent more than the ham. As the hogs became heavier, bacon increased in ether extract the most rapidly of any of the cuts or the carcass. Back fat increased at the slowest rate—even less rapidly than the loin. In the interpretation of data on fatness of hogs, carcasses, and cuts, the reader is reminded that this study dealt throughout with hogs of intermediate type.

A common measure of the nutritive value of foods is the calorie. It is fitting, therefore, that the products under consideration be evaluated on this well-known nutritional basis. According to the Food and Nutrition Board of the National Research Council, a moderately active man weighing 154 pounds requires 3.000 calories a day and a moderately active woman weighing 123 pounds requires 2.500 calories a day. The results in figure 8 show that the caloric value per pound of product is high and that it increases as the hogs become heavier. The caloric value of bacon increased at a remarkable rate.

The shoulder and ham increased less rapidly and the loin was distinctly the lowest, in this respect, of all cuts represented.

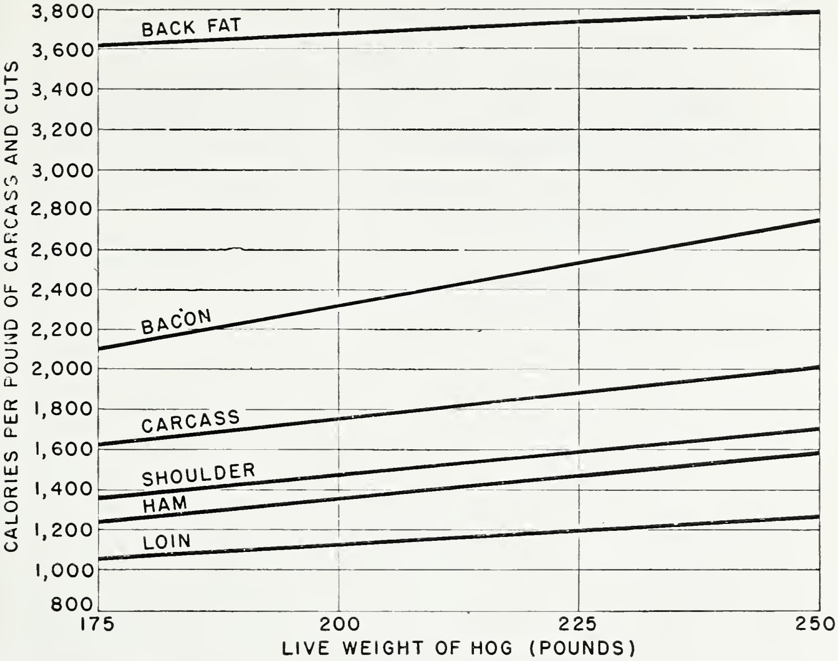

FIGURE 8.—Calories per pound of dressed carcass and primary cuts in relation to slaughter weight of hogs.

PROTEIN CONTENT

In view of the high growth-promoting and body-repair value of meat protein, it is logical that the protein content of various cuts should be determined in a study of this kind. As seen in figure 9, the loin, ham, and shoulder excelled in protein content. The figure shows also material decreases in protein in all cuts and in the entire carcass, with increasing live weight of hog. Bacon decreased most rapidly in this constituent, dropping from about 10 to 7 percent. In the skinned back fat, the protein, essentially connective tissue, was present in very small amount and decreased only slightly as the hog became heavier.

With respect to protein requirements in the diet, the National Research Council recommends 85 grams (0.19 pound) a day for a moderately active man of 154 pounds' weight and 70 grams (0.15 pound) a day for a moderately active woman of 123 pounds' weight. Figure 10 provides a graphic comparison of the quantities of protein per pound of different pork cuts and shows relative rates of change, as a hog becomes heavier. There was a decrease in all cases. A pound of loin furnished approximately 0.13 to 0.12 pound of protein. Thus a chop weighing one-third of a pound would furnish about 0.04 pound of protein or more than a fifth of the daily protein requirements of a man.

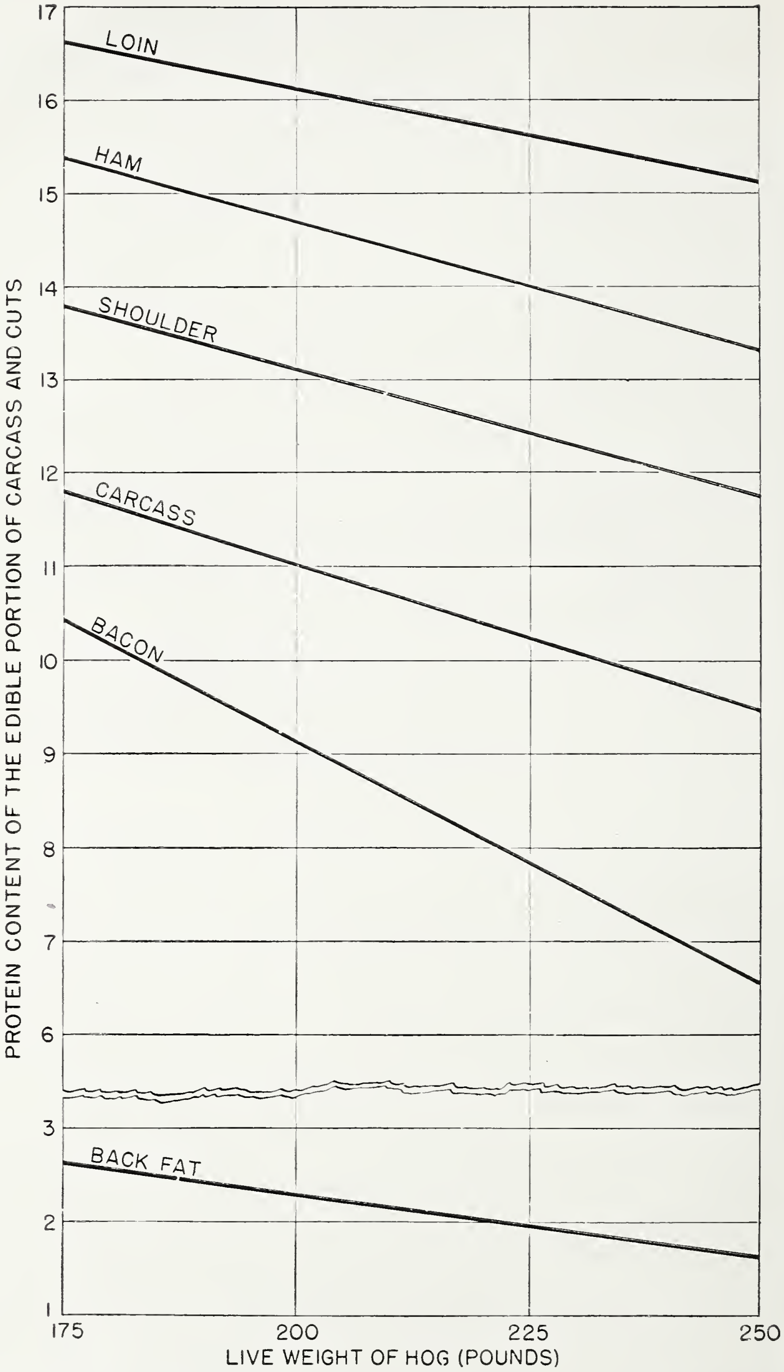

Figure 9.—Percentage of protein in the edible meat of dressed carcass and primary cuts in relation to slaughter weight of hogs.

As also shown in figure 10, the quantity of protein per pound of ham began at practically the same level as that in loin but decreased somewhat faster with increasing weight of hog. Shoulder and bacon furnished somewhat less protein, and in back fat the protein content was extremely low. The most rapid decrease, with advancing live weight of hog, occurred in bacon.

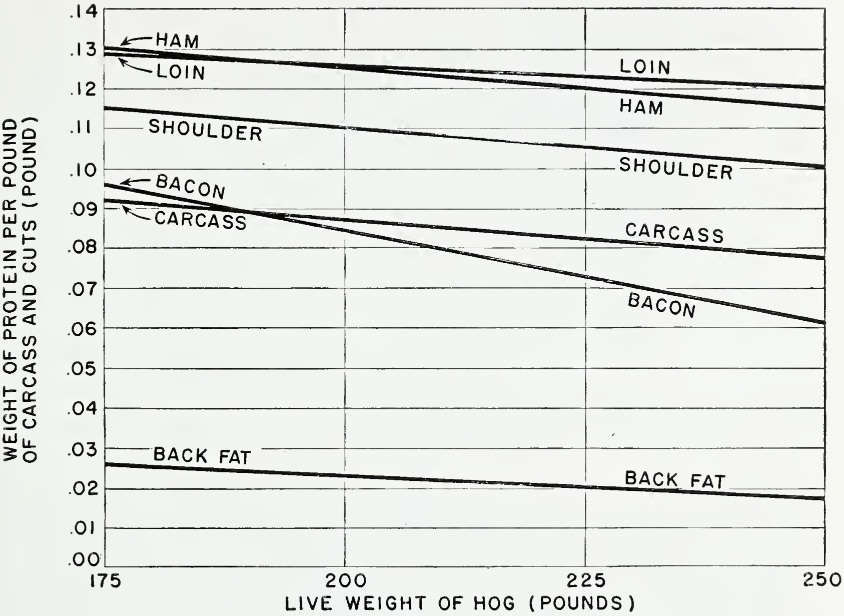

FIGURE 10.—Weight of protein per pound of dressed carcass and primary cuts in relation to slaughter weight of hogs.

ESTIMATION OF WEIGHTS, COMPOSITION, AND NUTRITIVE VALUE

The graphs, of course, provide opportunity for making estimates for any weight of hog or cut that may be desired within the ranges given. For example, by reference to figure 3 one can determine that 15-pound hams were produced by hogs weighing approximately 191 pounds. The regression lines for hams in figures 4 to 10, inclusive, at the live-weight stage of 191 pounds provide means of determining pertinent facts concerning the composition and nutritive value of hams of this weight. If the reader is interested in 17-pound hams, figure 3 shows that they were produced by hogs of about 220 pounds' weight, and again detailed information on the hams may be obtained from figures 4 to 10.

For the reader's further convenience in making comparisons, tables 1, 2, and 3—all based on the same data as the graphs—are presented.

Table 1 gives weights as well as physical composition of the carcasses and cuts. In the carcass, ham, loin, bacon, shoulder, and head, the percentage of edible meat is determined by adding the percentages for separable fat and separable lean. Figures 11, 12, and 13 supplement the information given in table 1 and show pictorially the relative sizes of the cuts and the proportions of fat and lean meat in those of different weights.

TABLE 1.—*Average weights and physical composition of the carcasses and principal trimmed cuts from hogs of four weight groups*[1]

Cuts and components	Weights and proportions of various parts from hogs at indicated live weights at slaughter			
	175 pounds	200 pounds	225 pounds	250 pounds
Chilled dressed carcass:				
Weight .... pounds	139	158	178	197
Separable fat .... percent	36.8	39.5	42.2	45.0
Separable lean .... do	40.6	39.3	38.0	36.7
Edible meat .... do	77.4	78.8	80.2	81.7
Bone .... do	15.8	14.6	13.3	12.1
Skin .... do	6.8	6.6	6.5	6.2
Trimmed cuts				
Ham:				
Weight (one ham) .... pounds	13.9	15.6	17.3	19.0
Separable fat .... percent	25.2	27.4	29.6	31.9
Separable lean .... do	59.3	57.6	55.8	54.0
Edible meat .... do	84.5	85.0	85.4	85.9
Bone .... do	10.9	10.3	9.8	9.3
Skin .... do	4.6	4.7	4.8	4.8
Loin:				
Weight (one loin) .... pounds	9.8	10.6	11.3	12.0
Separable fat .... percent	18.3	18.5	18.8	19.1
Separable lean .... do	59.2	59.5	59.8	60.0
Edible meat .... do	77.5	78.0	78.6	79.1
Bone .... do	22.5	22.0	21.4	20.9
Shoulder, full-cut:				
Weight (one shoulder) .... pounds	11.9	13.7	15.4	17.1
Separable fat .... percent	26.5	28.0	29.6	31.1
Separable lean .... do	56.9	56.2	55.4	54.6
Edible meat .... do	83.4	84.2	85.0	85.7
Bone .... do	11.4	10.7	10.0	9.4
Skin .... do	5.2	5.1	5.0	4.9
Bacon:				
Weight (one side) .... pounds	7.8	9.4	10.9	12.4
Separable fat .... percent	55.8	58.8	61.8	64.8
Separable lean .... do	36.0	33.7	31.4	29.1
Edible meat .... do	91.8	92.5	93.2	93.9
Skin .... do	8.2	7.5	6.8	6.1
Head, full-cut:				
Weight (one-half head) .... pounds	6.3	7.0	7.8	8.5
Separable fat .... percent	23.5	27.1	30.6	34.1
Separable lean .... do	21.1	20.2	19.4	18.7
Edible meat .... do	44.7	47.3	50.0	52.8
Bone .... do	38.8	35.9	33.0	30.0
Skin .... do	16.6	16.8	17.0	17.2
Spareribs:				
Weight (one side) .... pounds	1.4	1.6	1.8	2.0
Edible meat .... percent	55.6	58.1	60.6	63.1
Bone .... do	44.4	41.9	39.4	36.9
Shoulder ribs:				
Weight (one side) .... pounds	1.4	1.6	1.7	1.8
Edible meat .... percent	37.7	40.0	42.4	44.7
Bone .... do	62.3	60.0	57.6	55.3

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[1] Data are from regression lines for the 64 experimental hogs.

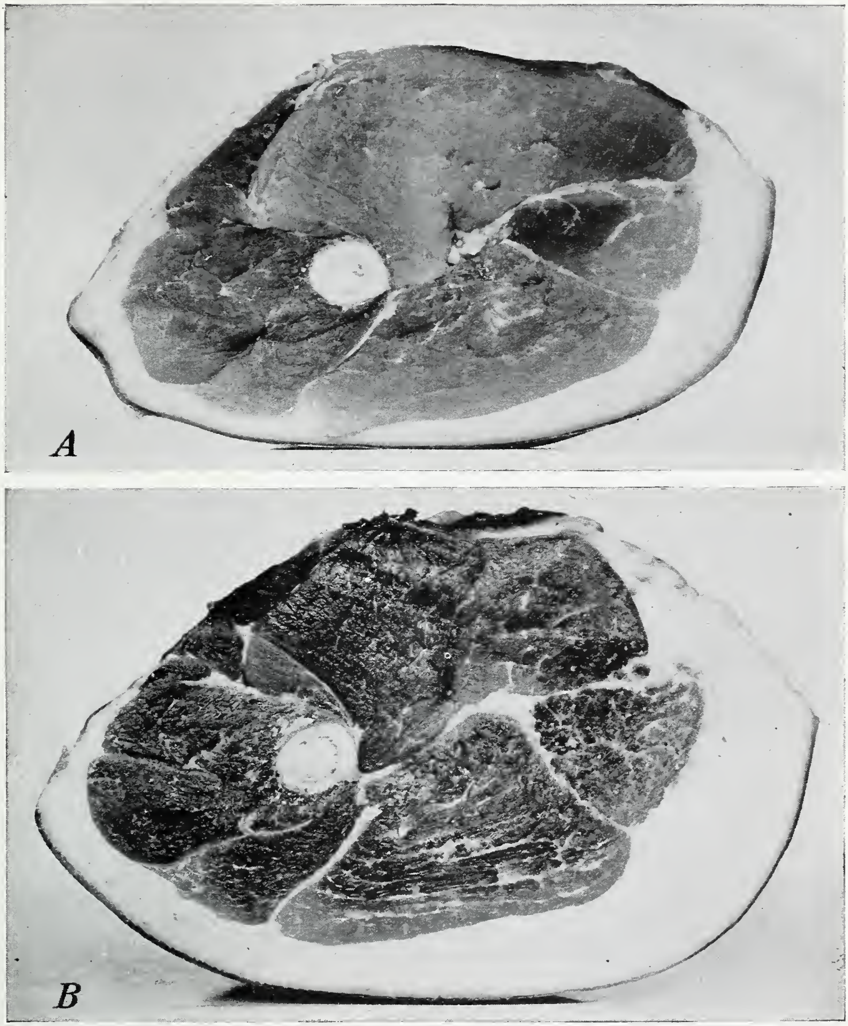

FIGURE 11.—Cross-section cuts from hams from hogs of different weights: *A*, Cut of ham weighing (whole) 13.9 pounds, from 175-pound hog; *B*, Cut of ham weighing (whole) 19.0 pounds, from 250-pound hog. The appearance of similar cuts from 200-pound and 225-pound hogs was intermediate.

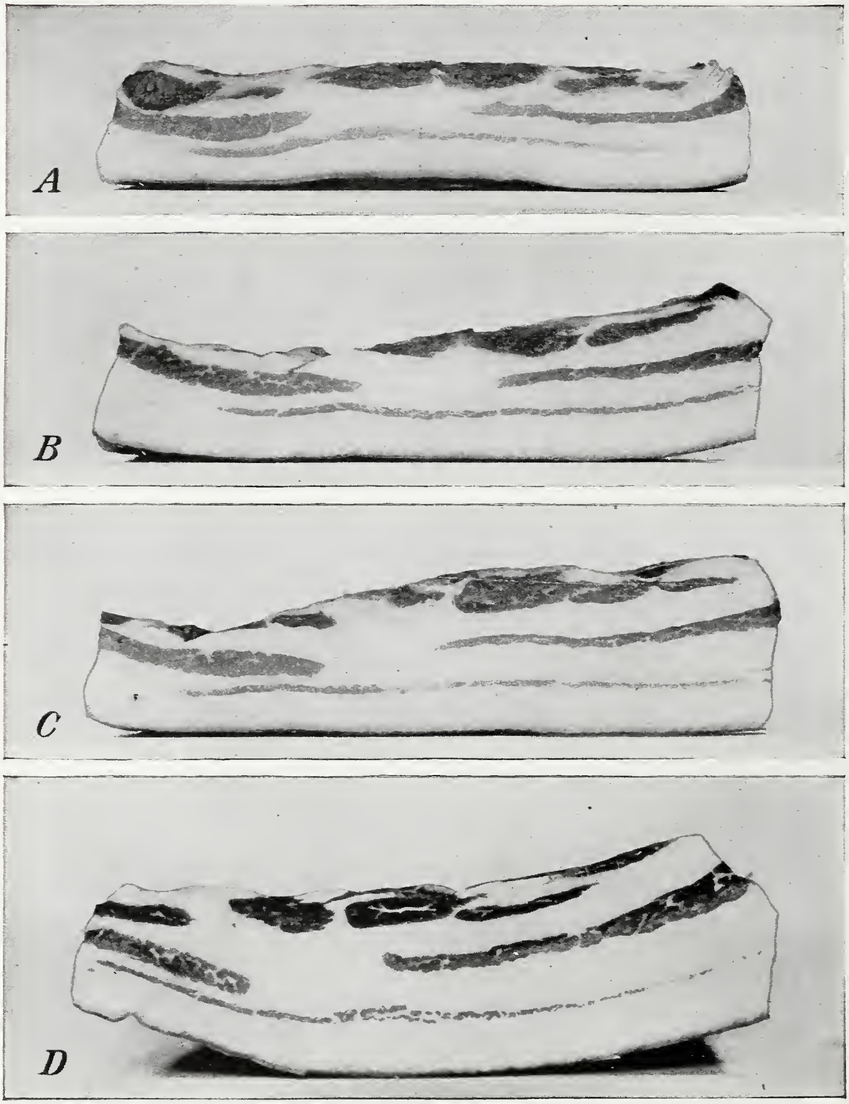

FIGURE 12.—Cross-section cuts from bacon from hogs of different weights: *A*, Cut of bacon weighing 7.8 pounds, from 175-pound hog; *B*, Cut of bacon weighing 9.4 pounds, from 200-pound hog; *C*, Cut of bacon weighing 10.9 pounds, from 225-pound hog; *D*, Cut of bacon weighing 12.4 pounds, from 250-pound hog.

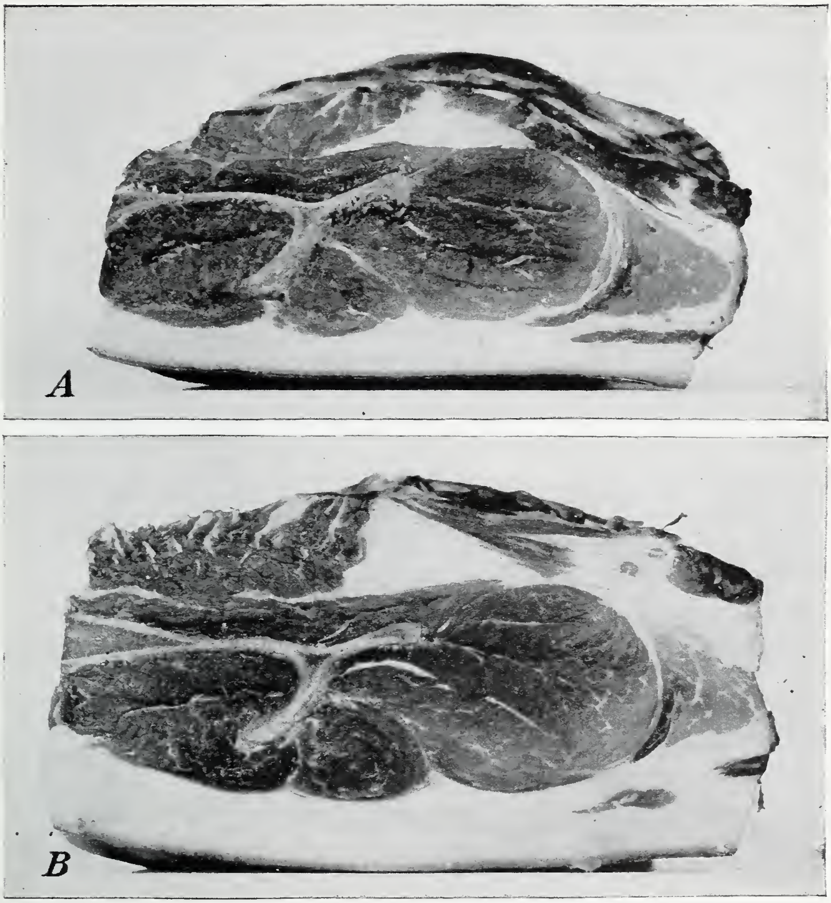

FIGURE 13.—Cross-section cuts of shoulders from hogs of different weights: *A*, Cut of shoulder weighing (whole) 11.9 pounds, from 175-pound hog; *B*, Cut of shoulder weighing (whole) 17.1 pounds, from 250-pound hog. The appearance of similar cuts from 200-pound and 225-pound hogs was intermediate.

Table 2 presents data on the chemical composition of the edible portion of the carcasses and major cuts from hogs of the different weights. Table 3 gives total weights and weights of edible meat for the carcasses and cuts, supplemented with weights of protein and numbers of calories per pound as purchased and per pound of edible meat. Thus it is possible to estimate the protein and energy derived from the entire dressed carcass or particular cuts from hogs having a considerable range in weight.

TABLE 2.—*Chemical composition of the edible portion of the carcasses and principal trimmed cuts from hogs of four weight groups*[1]

Cuts and components	Number of hogs	Composition of carcass or designated cut for hogs weighing—			
		175 pounds	200 pounds	225 pounds	250 pounds
		Percent	*Percent*	*Percent*	*Percent*
Chilled dressed carcass:	63				
Ether extract (fat)		46.01	49.27	52.54	55.80
Protein		11.81	11.01	10.22	9.42
Moisture		41.81	39.43	37.05	34.68
Ash		.59	.56	.53	.49
Trimmed cuts:					
Ham—	63				
Ether extract (fat)		29.12	32.36	35.59	38.82
Protein		15.38	14.68	13.99	13.29
Moisture		54.81	52.47	50.14	47.80
Ash		.81	.75	.70	.64
Loin—	44				
Ether extract (fat)		25.97	28.02	30.08	32.14
Protein		16.61	16.11	15.60	15.09
Moisture		57.00	55.33	53.65	51.98
Ash		.81	.79	.77	.75
Shoulder, full-cut—	26				
Ether extract (fat)		33.85	36.90	39.94	42.99
Protein		13.78	13.09	12.40	11.72
Moisture		52.00	49.70	47.41	45.12
Ash		.67	.65	.63	.61
Bacon—	35				
Ether extract (fat)		51.45	57.18	62.92	68.65
Protein		10.42	9.12	7.83	6.54
Moisture		37.76	33.47	29.18	24.89
Ash		.48	.43	.38	.33
Backfat, skinned—	42				
Ether extract (fat)		87.74	89.21	90.68	92.15
Protein		2.62	2.29	1.96	1.63
Moisture		9.15	8.27	7.39	6.52
Ash		.11	.10	.10	.09

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[1] Data are from regression lines.

TABLE 3.—*Average weights (including protein) and caloric values for the carcasses and principal trimmed cuts from hogs of four weight groups* [1]

Cuts and components		Data for hogs weighing—			
		175 pounds	200 pounds	225 pounds	250 pounds
Chilled dressed carcass:					
Total weight	pounds	139	158	178	197
Edible meat [2]	do	107.5	124.5	142.8	160.9
Protein—					
Per pound as purchased	pound	.09	.09	.08	.08
Per pound of edible meat	do	.12	.11	.10	.09
Calories—					
Per pound as purchased	number	1,618	1,742	1,869	2,000
Per pound of edible meat	do	2,092	2,211	2,330	2,449
Trimmed cuts:					
Ham—					
Total weight (one ham)	pounds	13.9	15.6	17.3	19.0
Edible meat (one ham)	do	11.8	13.3	14.8	16.3
Protein—					
Per pound as purchased	pound	.13	.12	.12	.11
Per pound of edible meat	do	.15	.15	.14	.13
Calories—					
Per pound as purchased	number	1,241	1,350	1,458	1,569
Per pound of edible meat	do	1,467	1,588	1,707	1,827
Loin:					
Total weight (one loin)	pounds	9.8	10.6	11.3	12.0
Edible meat (one loin)	do	7.6	8.2	8.9	9.5
Protein—					
Per pound as purchased	pound	.13	.13	.12	.12
Per pound of edible meat	do	.17	.16	.16	.15
Calories—					
Per pound as purchased	number	1,052	1,123	1,187	1,251
Per pound of edible meat	do	1,359	1,439	1,511	1,583
Shoulder, full cut:					
Total weight (one shoulder)	pounds	11.9	13.7	15.4	17.1
Edible meat (one shoulder)	do	10.0	11.5	13.1	14.7
Protein—					
Per pound as purchased	pound	.12	.12	.11	.10
Per pound of edible meat	do	.14	.13	.12	.12
Calories—					
Per pound as purchased	number	1,362	1,467	1,577	1,693
Per pound of edible meat	do	1,633	1,743	1,856	1,974
Bacon:					
Total weight (one side)	pounds	7.8	9.4	10.9	12.4
Edible meat (one side)	do	7.2	8.7	10.2	11.7
Protein—					
Per pound as purchased	pound	.09	.08	.07	.06
Per pound of edible meat	do	.10	.09	.08	.07
Calories—					
Per pound as purchased	number	2,100	2,314	2,524	2,743
Per pound of edible meat	do	2,286	2,501	2,708	2,921
Back fat, skinned:					
Total weight (one side)	pounds	5.1	6.4	7.7	9.0
Protein per pound	pound	.03	.02	.02	.02
Calories per pound	number	3,625	3,685	3,737	3,791

[1] Data are from regression lines. The figures for total weight and edible meat are for 64 hogs. Other values are for same number of hogs listed in table 2 for corresponding cuts.

[2] Edible meat consists of the lean and fat that can be separated by hand from the bone and skin.

APPLICATION OF RESULTS

In the final analysis, the value of a hog when ready for market should depend not only on its weight but on the relative proportions of the different products—loin, hams, bacon, and other cuts—it will yield and what they are worth to the consumer. In a sense, the packer and retailer are agents for the producer and act as intermediaries who cater to the consumer. Every factor that bears on the final acceptability and usefulness of the products may be viewed as being important to the hog producer.

It has been shown that two 250-pound hogs, weighing a total of 500 pounds, produced practically the same amount of edible meat as three 175-pound hogs weighing a total of 525 pounds. Naturally, the producer would be greatly interested in knowing, for example, whether on the whole the edible products from the heavier hogs are normally more or less acceptable to the consumer than those from the lighter hogs. If equally acceptable, the 250-pound hogs would appear to be 5 percent more valuable per unit of live weight than the 175-pound hogs, since the latter required 5 percent more such weight to produce a given amount of edible meat. However, if the edible products from the 175-pound hogs were the more desirable, the difference in live-hog value would tend to disappear; and, provided the preference for their products was sufficiently strong, the value of the lighter hogs per unit of weight would exceed that of the heavier hogs. Similarly, information on the nutritive value of cuts from hogs of different weights enables nutrition specialists, dietitians, and consumers to make choices of pork products more wisely according to the need to be served.

In view of the variety of products obtained from dressed hog carcasses and the wide variation in weight and other characteristics of each as offered on the market, the practical uses of the information presented here are admittedly not simple. However, knowledge of the comparable values should be helpful in dealing with the many practical and scientific questions that arise in the production and marketing of hogs and uses of their products.

A typical example of such application of results is found in the information on hams. Between a 17.3-pound ham from a 225-pound hog and a 13.9-pound ham from a 175-pound hog the average difference in edible-meat content was less than 1 percent. However, the lighter ham contained 59.3 percent of lean meat and the heavier one 55.8 percent. The former had more protein per pound of total edible meat, whereas the latter was the fatter and had a distinctly higher caloric value.

By way of further example, the average live weight of barrows and gilts sold on seven leading United States markets during 1938 to 1943, inclusive, was 230 pounds. The data presented here for hogs weighing 225 pounds at slaughter are regarded as a good index of the average of the barrows and gilts marketed during that period. The information on hogs of that weight and also on lighter and heavier animals provides a basis for numerous comparisons involving weight and fatness of cuts. In the aggregate, meat purchasers' selections influenced by these factors—signifying consumer preference—should help acquaint the meat trade and swine growers more fully with the weights and degrees of finish most desired. That information should lead, in time, to the more general production of hogs that produce such products.

SUMMARY AND CONCLUSIONS

The study was conducted to provide more specific and complete data than were heretofore available on the composition and certain nutritive properties of pork from market hogs ranging from approximately 175 to 250 pounds in weight.

The information obtained has prospective value in (1) determining desired weights and degrees of finish, (2) estimating weights of pork cuts from hogs of various market weights, (3) calculating the food value of different cuts from hogs of various weights, (4) determining the physical and chemical composition for dietary purposes.

Sixty-four hogs of intermediate type, weighing from 167 to 254 pounds, were selected and slaughtered for the study. This type was selected as being most representative of present, and probably future, market preference. In general, the feeds given were representative of those used in producing market hogs.

The data are presented graphically by means of regression lines, together with supplementary tables based on such lines. The results are essentially basic and are adapted to a wide variety of uses. The study led to the following conclusions:

Regardless of weight of hog, the weight increases of ham, shoulder, bacon, and back fat are approximately equal. That of loin is less.

The difference between weight of dressed carcass or of the different primary cuts and the weight of edible meat of each varies little as the hog becomes heavier. However, the proportion of edible meat tends to increase. Two 250-pound hogs furnish practically the same quantity of edible meat as three 175-pound hogs, but the heavier hog should not be considered necessarily the more efficient producer.

With increasing weight of hogs, bacon and the entire dressed carcass increase in separable fat content at about the same rate. The difference between shoulder and ham in this respect is small and unimportant. The rate of increase for loin is very small.

In general, loin contains the highest proportion of lean meat and head the lowest. Ham, shoulder, carcass, and bacon are intermediate, in decreasing order as mentioned. Five 175-pound hogs yield about as much lean as four 250-pound hogs.

Bacon is highest in proportion of total edible meat. Ham and shoulder are next and differ little. Carcass, loin, spareribs, head, and shoulder ribs follow in order. Spareribs are about a third more meaty than shoulder ribs.

Back fat is extremely high in ether-extract content. Loin and ham, on the other hand, are relatively low. The shoulder contains about 5 percent more than the ham. Associated with increase in live weight of hog, bacon increases the most rapidly in this constituent.

Back fat, bacon, shoulder, ham, and loin are valuable in decreasing order as mentioned, in supplying calories. The heavier the hog producing the cut the higher is the caloric value per pound of product.

Loin and ham produce the most protein, and back fat the least, per pound of product. One loin chop, weighing 0.33 pound, for example, furnishes about 20 percent of the daily protein requirements of a moderately active, 154-pound man. All cuts decrease—bacon the most rapidly—in proportion of protein as live weight of hog increases.

The data presented for 225-pound hogs are regarded as a good index of the average weight, composition, and nutritive value of the cuts from barrows and gilts marketed in the United States during 1938–43. On the basis of past experience and the information here presented, purchasers of pork products can, by their selections, influence the production of hogs that yield cuts of the weights and degrees of fatness that most consumers prefer. Such consumer preference should in time lead to a more general production of hogs that produce those cuts.

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